

### **3-DIMENSIONAL HINGE**

#### **BACKGROUND AND SUMMARY OF THE INVENTION**

5           The present invention relates to a hinge and, more particularly, to a simple and inexpensive 3-dimensional hinge that can conveniently be adjusted leftwards, rightwards, upwards, as well as downwards during installation and, that produces less noise during operation.

10           US5,005,256 discloses a structure of hinge. This structure of hinge has numerous drawbacks as follows:

1. When going to strike the pointed teeth of the two pivoted parts of the hinge **9** into swinging door and door frame **90**, the elevational position of the two pivoted parts cannot be adjusted relative to each other to let the swinging  
15           door be precisely secured to the door frame in position.
2. The left-hand part **91** and right-hand part **92** are rectangular frame members that have a complicated structure and a high material cost, in consequence  
20           the mold for making the two pivoted parts **91** and **92** of the hinge **9** is expensive.
3. The left-hand part **91** and right-hand part **92** of the hinge **9** have pointed teeth **911** or **921** extending therefrom at the back around three of the four  
25           sides. When striking the pointed teeth **911** and **921** into the wooden swinging

door and door frame 90, the wooden swinging door and door frame 90 may be damaged easily.

4. When the user opening/closing the swinging door after installation of the hinge, much noise is produced.

Therefore, it is desirable to provide a 3-dimensional hinge that eliminates the aforesaid drawbacks.

The present invention has been accomplished under the circumstances in view. According to one aspect of the present invention, the 3-dimensional hinge is comprised of a shaft, top and bottom adjustment screws respectively threaded into the top and bottom sides of the shaft, upper and lower left-hand leaves and right-hand leaves respectively coupled to the threaded shanks of the adjustment screws for striking into a first wooden member, the upper right-hand leaf and the lower left-hand leaves being respectively coupled to the adjustment screws by a slip joint for permitting the wooden members to be adjusted horizontally relative to each other during installation of the hinge. The upper and lower left-hand leaves and right-hand leaves each have a stop element for guiding the positioning during installation. According to another aspect of the present invention, the upper and lower left-hand leaves and right-hand leaves are respectively stamped from a metal plate member to reduce the manufacturing cost. According to still another aspect of the present invention, two bearings are respectively sleeved onto the adjustment screws and supported between the upper and lower left-hand leaves and the upper and lower

right-hand leaves to reduce noise during operation of the hinge.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

5           Figure 1 is an exploded view of a structure of hinge according to US5,005,256.

          Figure 2 is an assembly view of the structure of hinge according to US5,005,256.

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          Figure 3 is an exploded view of a 3-dimensional hinge according to the present invention.

          Figure 4 is an assembly view of the 3-dimensional hinge according to  
15   the present invention.

          Figure 5 is a sectional view of the 3-dimensional hinge according to the present invention.

20           Figure 6 is a schematic sectional view showing an adjustment example of the present invention.

### **DETAILED DESCRIPTION OF THE INVENTION**

25           Referring to Figures 3~6, a 3-dimensional hinge is shown adapted to connect two wooden objects **10** (for example, a wooden swinging door and a

wooden door frame) together, permitting one (the swinging door) to swing against the other (the wooden door frame). The 3-dimensional hinge is comprised of a top adjustment screw 1, an upper left-hand leaf 2, a top bearing 31, an upper right-hand leaf 4, a shaft 5, a lower left-hand leaf 6, a bottom bearing 32, a lower right-hand leaf 7, and a bottom adjustment screw 8.

The top adjustment screw 1 has a threaded shank 11 inserted downwards in proper order through the upper left-hand leaf 2, the top bearing 31 and the upper right-hand leaf 4, and then threaded into the top side of the shaft 5.

The bottom adjustment screw 8 has a threaded shank 81 inserted upwards in proper order through the lower right-hand leaf 7, the bottom bearing 32 and the lower left-hand leaf 6, and then threaded into the top side of the shaft 5.

The upper left-hand leaf 2 has a through hole 21 vertically disposed at one end for the passing of the top adjustment screw 1, a plurality of pointed teeth 22 and 23 horizontally forwardly extended therefrom at the front side for striking into one wooden object (for example, the wooden door frame), and a stop element 24 for stopping at one side of the wooden object (the wooden door frame) to guide the pointed teeth 22 and 23 into the wooden object during installation.

The top bearing 31 is sleeved onto the threaded shank 11 of the top

adjustment screw 1, and stopped between the upper left-hand leaf 2 and the upper right-hand leaf 4.

The upper right-hand leaf 4 has an oblong through hole 41 vertically disposed at one end for the passing of the threaded shank 11 of the top adjustment screw 1, a plurality of pointed teeth 42 and 43 horizontally forwardly extended therefrom at the front side for striking into one wooden object (for example, the wooden swinging door), and a stop element 44 for stopping at one side of the wooden object (the wooden swinging door) to guide the pointed teeth 42 and 43 into the wooden object during installation.

The shaft 5 has a top screw hole 51 disposed at the top side and adapted to receive the threaded shank 11 of the top adjustment screw 1, and a bottom screw hole 52 (see Figure 5) disposed at the bottom side and adapted to receive the threaded shank 81 of the bottom adjustment screw 8.

The lower left-hand leaf 6 has an oblong through hole 61 vertically disposed at one end for the passing of the threaded shank 81 of the bottom adjustment screw 8, a plurality of pointed teeth 62 and 63 horizontally forwardly extended therefrom at the front side for striking into one wooden object 10 (for example, the wooden door frame), and a stop element 64 for stopping at one side of the wooden object (the wooden door frame) to guide the pointed teeth 62 and 63 into the wooden object during installation.

The bottom bearing 32 is sleeved onto the threaded shank 81 of the

bottom adjustment screw 8, and stopped between the lower left-hand leaf 6 and the lower right-hand leaf 7.

The lower right-hand leaf 7 has a through hole 71 vertically disposed at one end for the passing of the threaded shank 81 of the bottom adjustment screw 8, a plurality of pointed teeth 72 and 73 horizontally forwardly extended therefrom at the front side for striking into one wooden object (for example, the wooden swinging door), and a stop element 74 for stopping at one side of the wooden object (the wooden swinging door) to guide the pointed teeth 72 and 73 into the wooden object during installation.

By means of the oblong through hole 41 of the upper right-hand leaf 4 (see Figure 6) and the oblong through hole 61 of the lower left-hand leaf 6, the wooden objects can be horizontally adjusted relative to each other (i.e., the wooden swinging door can be adjusted horizontally leftwards or rightwards relative to the wooden door frame; see the imaginary line in Figure 6). By means of rotating the top adjustment screw 1 in the top side of the shaft 5 and the bottom adjustment screw 8 in the bottom side of the shaft 5 in clockwise or counter-clockwise direction, the relative vertical position between the wooden objects can be adjusted (see the imaginary line in Figure 5). Because the leaves 2, 4, 6, and 7 are flat plate members, driving the pointed teeth of the leaves 2, 4, 6, and 7 into the wooden objects does not break the leaves 2, 4, 6, and 7 or cause the leaves 2, 4, 6, and 7 to deform. Because the leaves 2, 4, 6, and 7 are flat plate members, they can easily be made by stamping to reduce the cost. Because the top bearing 31 is supported between the upper left-hand leaf 2 and the upper

right-hand leaf 4 and the bottom bearing 32 is supported between the lower left-hand leaf 6 and the lower right-hand leaf 7, the hinge produces less noise when operated.

5           Further, the pointed teeth 22 and 23 of the upper left-hand leaf 2, the pointed teeth 42 and 43 of the upper right-hand leaf 4, the pointed teeth 62 and 63 of the lower left-hand leaf 6, and the pointed teeth 72 and 73 of the lower right-hand leaf 7 each have a barbed tip 221, 231, 421, 431, 621, 631, 721, 731. When driven into the wooden objects, the barbed tip 221, 231, 421, 431, 621,  
10 631, 721, 731 prohibit the respective pointed teeth 22,23;42,43; 62,63; 72,73 from backward displacement.

A prototype of 3-dimensional hinge has been constructed with the features of Figures 3~6. The 3-dimensional hinge functions smoothly to provide  
15 all of the features discussed earlier.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention.  
20 Accordingly, the invention is not to be limited except as by the appended claims.